

Daily to Interannual Variability in Mars' Surface Pressure

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We present an empirical orthogonal function decomposition of Mars' Northern Hemisphere surface pressure variability on daily to interannual timescales using the output of the GFDL Mars model. Using bidaily averages, we show that the first two EOFs comprise a zonal wavenumber 1 baroclinic wave which is active throughout northern winter, concentrated at 70N latitude, accounts for 53% of northern surface pressure variability, and moves eastward with a period of 6 to 8 sols. The third EOF is annular about the north pole, is active only at the onset and demise of the baroclinic wavenumber 1 wave, and accounts for 7% of the northern hemisphere surface pressure variability. It is reminiscent of the Arctic Oscillation in the Earth's atmosphere. It can reside in pseudo-stationary states for 20 to 30 sols, and since its activity coincides with the activity of wavenumber 2, 3, and 4 waves, we speculate that it is these waves which act as a pump for the annular mode. We will also discuss the modal variability of other Mars GCMs.